ABSTRACT OF THE DISCLOSURE

[0035] Present invention provides enabling methods of integrating novel nanotube elements into semiconductor devices, such as transistor containing electronic device. This is done in a series of process steps, which consist of attaching magnetic nanoparticles to nanotubes, tailoring magnetic nanotubes of selected size (diameter and length), filtration of nanotube to pre-determined sizes, preparing nanotube precursor in aqueous chemicals to form colloidal solutions of proper concentration, dispersing nanotube-containing solutions onto wafer surface, and finally positioning nanotubes at desired locations by magnetically assisted assembly to complete nanotube device structure. The key to this invention is to provide miniature nanotubes with tangible physical properties, in this case, magnetic properties, so that they can be aligned, filtered, and precisely directed to desired locations for device application. Such processes enable nanotubes to be compatible with typical semiconductor wafer processing technologies.